

Example #11. A Truck pulls a log with a force of 2500 N. The log drags back with a 800 N force of friction. The mass of the truck is 2500 kg, the mass of the log is 600 kg. Find:

- the acceleration of the truck & log system.
- the tension in the rope.



a) f.b.d. of the system:



(vertical forces aren't needed)

$$F_{\text{Net}} = 2500 - 800 = 1700 \text{ N}$$

$$F_{\text{Net}} = m_T a \quad 1700 = 3100 a$$

$$\boxed{a = 0.55 \text{ m/s}^2}$$

b) f.b.d. of the log:



$$a = 0.55 \text{ m/s}^2 \Rightarrow F_{\text{Net}} = 600 (0.55) = 330 \text{ N}$$

$$F_{\text{Net}} = F_T - 800 \Rightarrow F_T = 330 + 800$$

$$\boxed{F_T = 1.1 \times 10^3 \text{ N}}$$

Note:  $F_T$  could also be found by analyzing the truck.